

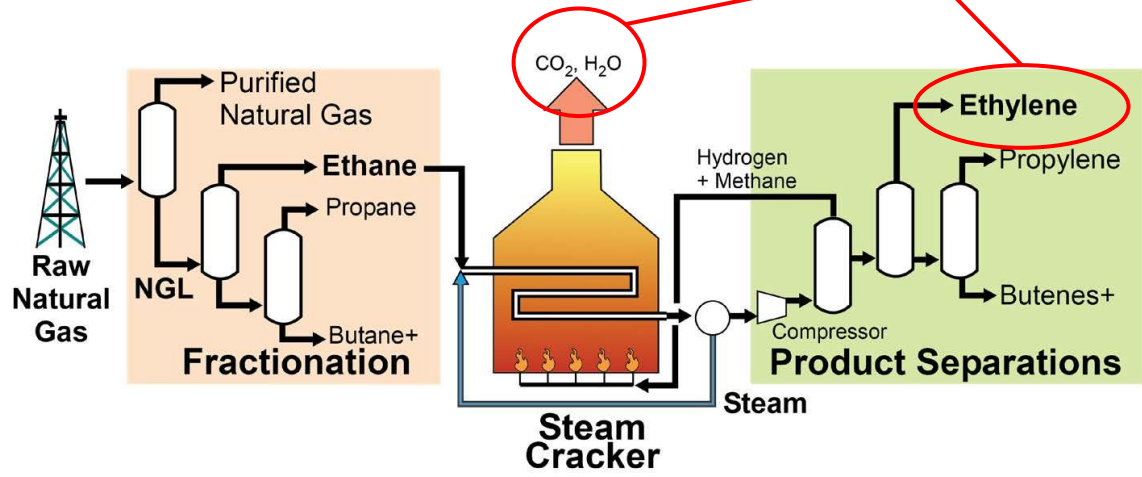


Sustainable Ethylene Production via CO₂ Reduction

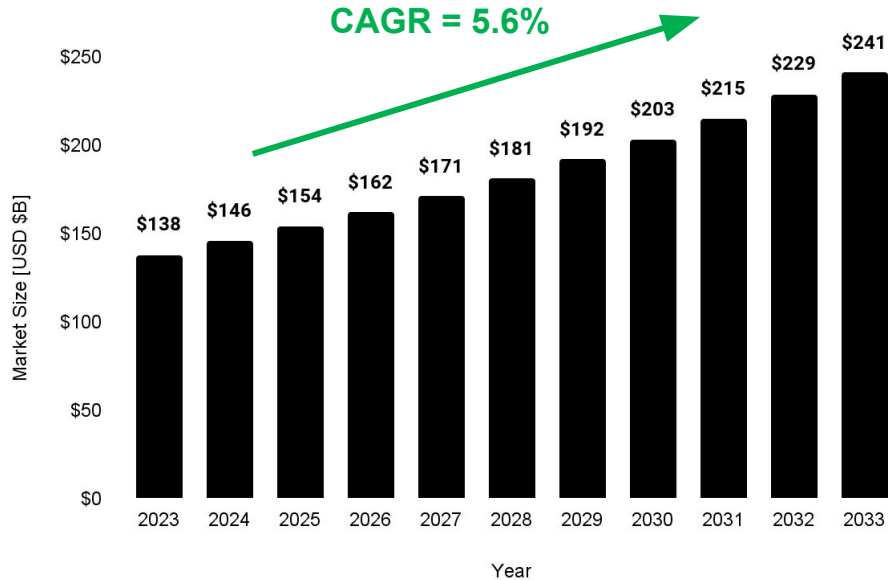
Ethylene production materially contributes to global carbon emissions

Steam cracking for ethylene production emits over **260 million metric tons of CO₂ annually**, nearly **1% of the world's 2023 total carbon emissions of 35.8 billion metric tons**, according to (Li et al., 2024).

1.5 metric tons CO₂ for every 1 metric ton of ethylene produced



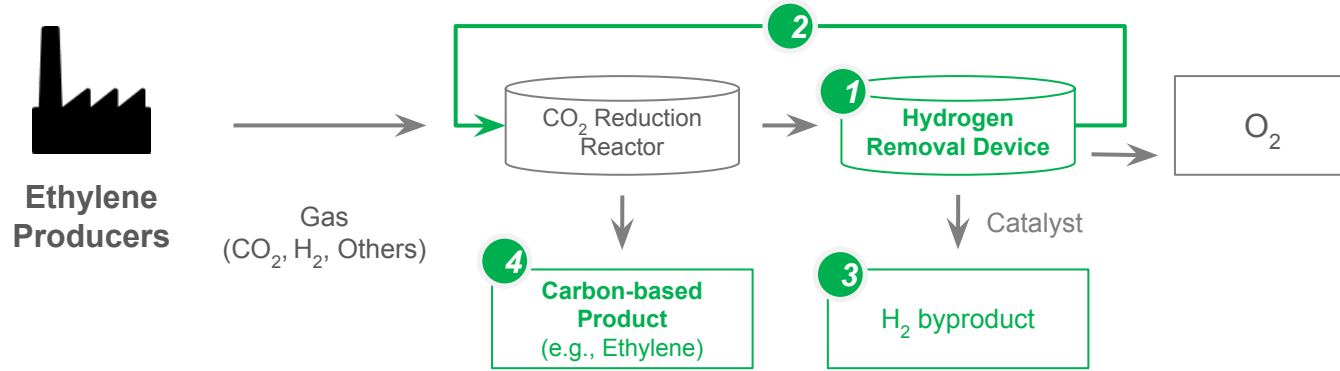
Ethylene production TAM is large at \$140B and is expected to grow consistently over the next ten years



Ethylene demand of the future:

- Buyers are looking for more sustainable sources of ethylene.
- Polyethylene demand will continue to persist given its importance to many products (most notably packaging which is 38.5% of global ethylene revenue share).
- Emerging economies will have higher demand for ethylene and its byproducts.

Compared to competition, LBNL looped technology yields 10-20x higher concentration of ethylene



1 High Temperature

Keeps high temperature for effectively reducing hydrogen, which prevents CO₂ reduction reaction

2 Looping CO₂ gas

Increases carbon-based product concentration by looping gas within the loop system and effectively reducing CO₂ in the gas

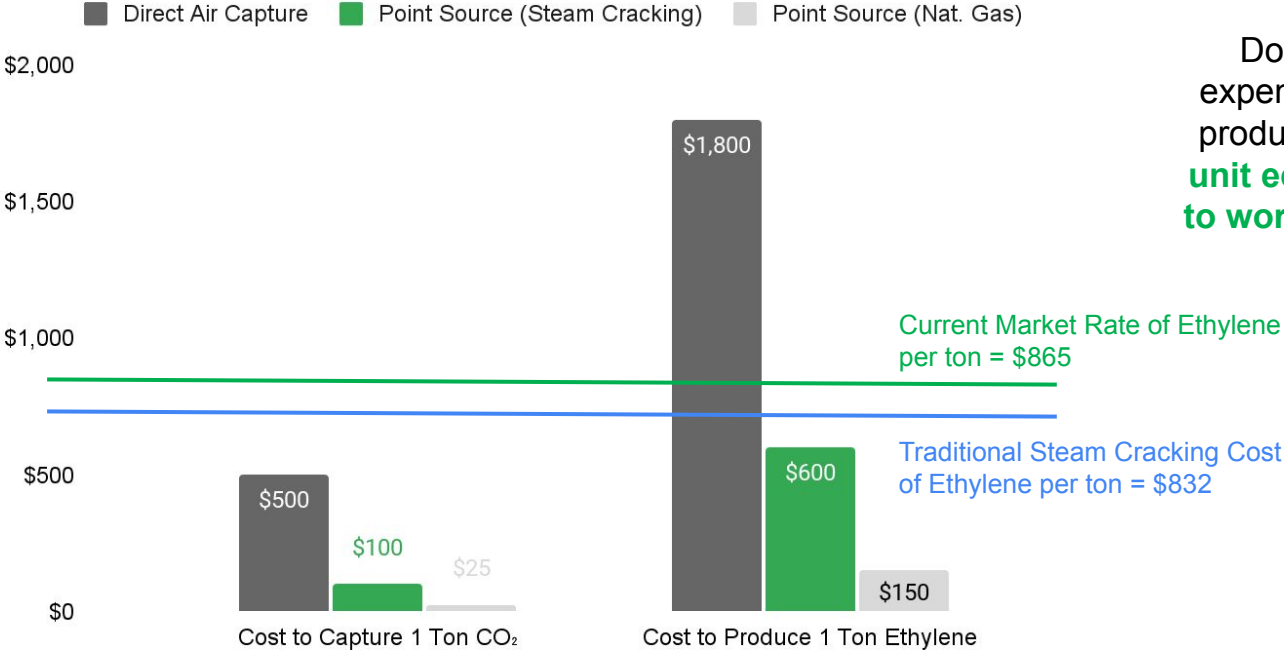
3 High Purity H₂ byproduct

Creates high purity H₂ byproduct, which potentially can be sold as a separate product

4 Significant ethylene concentration

Approximately 10-20X better ethylene concentration compared to other literatures

On the surface, the unit economics appear to favor production of ethylene via CO₂ capture and reduction

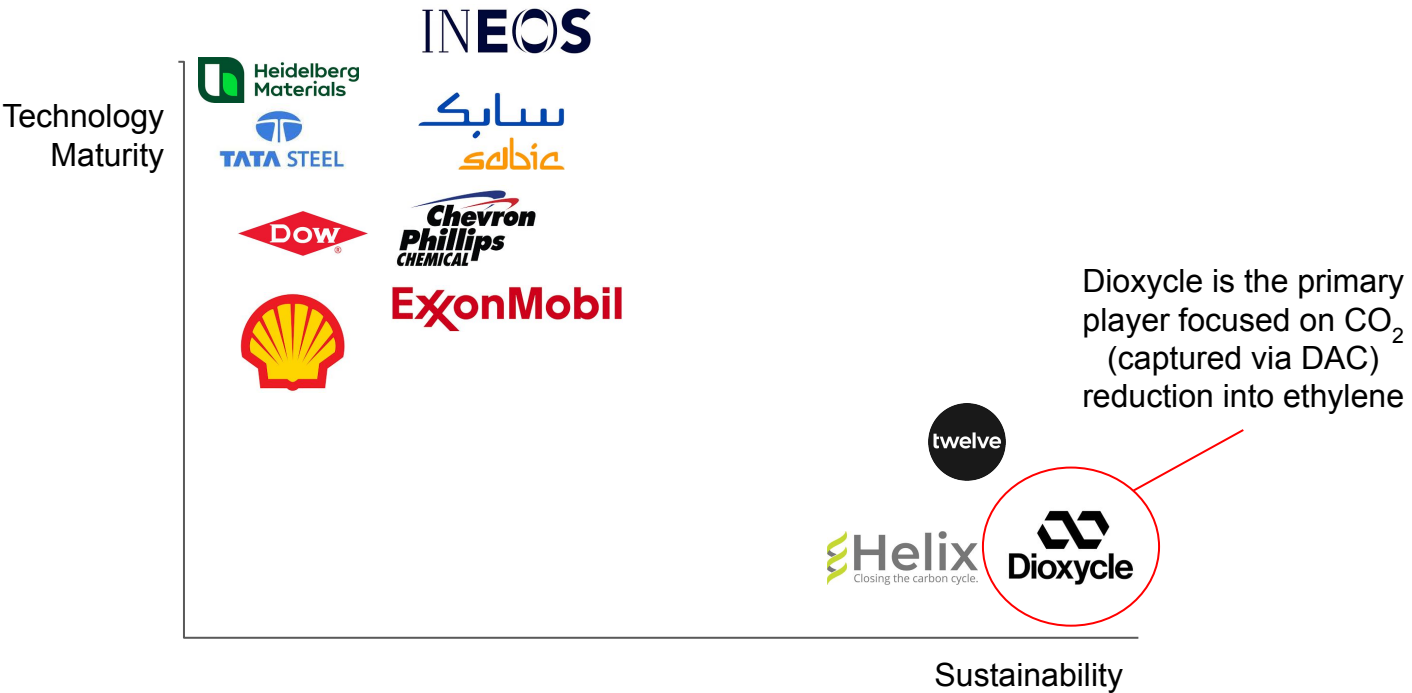


Does not take into account all expenses associated with ethylene production, but it illustrates that the **unit economics have the potential to work in favor of our technology.**

*Based on UIC researchers convert 6 metric tons of carbon dioxide into 1 metric ton of ethylene

Source of Cost Estimates: IEA

Few players in the market directly competing as sustainable alternatives to traditional ethylene production



*Non-exhaustive